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Department of Computer Science

CMPT 481/898 Midterm Exam

October 14, 2003 Time: 75 minutes Total marks: 70

Name: _____

Student Number: _____

Question 1 (1 mark)

Explain why evaluation comes before design in the HCI design cycle.

This is done so that we actual build the right system. A system that will do the task required by the user.

Question 2 (3 marks)

Fill in the blanks with three qualities that complete the sentence "usability is the degree to which a user's tasks can be carried out..."

1. Efficienty
2. Effectively
3. Satisfactory

Question 3 (6 marks)

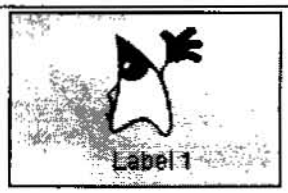
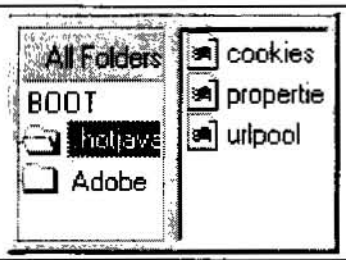
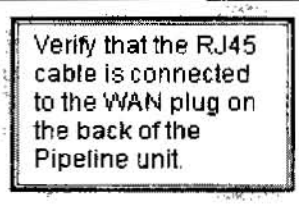
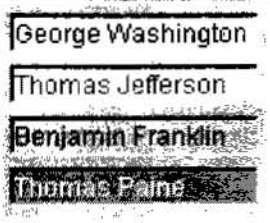
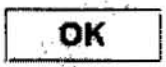
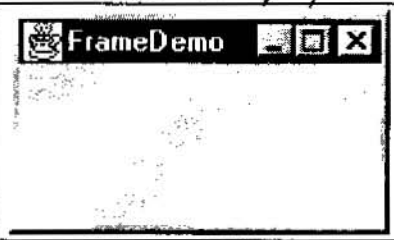
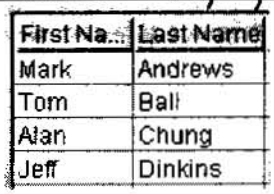
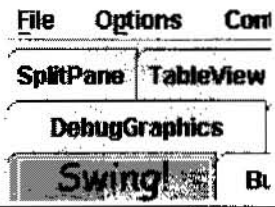
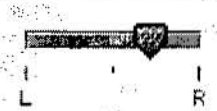
State, in one sentence each, three advantages of a direct-manipulation UI compared to a command-language UI, and three advantages of a command-language UI compared to a direct-manipulation UI.

The three advantages of a direct manipulation UI are that there is little memorization needed, its easier to explore (limited mouse commands), easier to see what actions are possible.

The three advantages for a command-language UI is that it is faster to use for those who have experience, you can batch processed easily, it also requires less graphics capacity than direct-manipulation UI.

Question 4 (8 marks)

Java Swing organizes its widgets into categories. For each of the following widgets, give the name of the Java class implementing the widget, and the Swing category.

		
JLabel	JSplit Pane	J Text Pane
Uneditable Display	Container	Editable Display
		
JTextField	JButton	JFrame
Editable Display	Control	Container
		
JTable	JTabbed Pane	JSlider
Editable Display	Container	Control

Question 5 (4 marks)

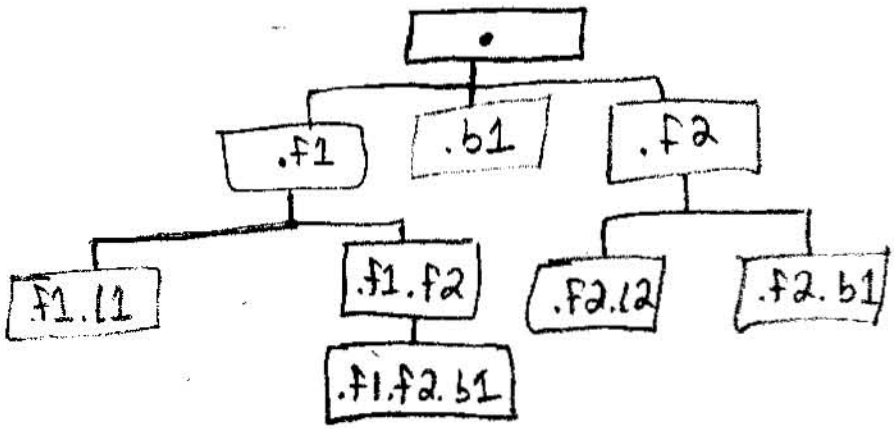
State four kinds of functionality that is provided to Swing components through inheritance from the JComponent class.

- paintComponent(Graphics g) is inherited this is used when repaint() is called.
- getBounds() is inherited to find the component's area.
- getX(), getY() are inherited to find its location.
- Listeners are inherited such as componentListener.

Question 6 (9 marks)

Draw the containment hierarchy for the following Tcl/Tk code.

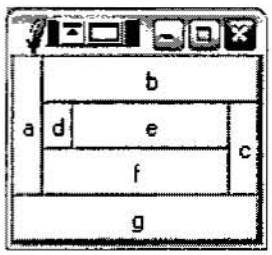
```
frame .f1
button .b1
frame .f1.f2
button .f1.f2.b1
label .f1.l1
frame .f2
label .f2.l2
button .f2.b1
```



Question 7 (7 marks)

Given the widgets defined below, write packer code that would result in exactly the following picture.

```
button .ba -text "a"
button .bb -text "b"
button .bc -text "c"
button .bd -text "d"
button .be -text "e"
button .bf -text "f"
button .bg -text "g"
```

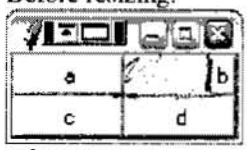



```
pack .bg -side bottom
pack .ba -side left
pack .bb -side top
pack .bc -side right
pack .bf -side bottom
pack .bd -side left
pack .be -side right
```

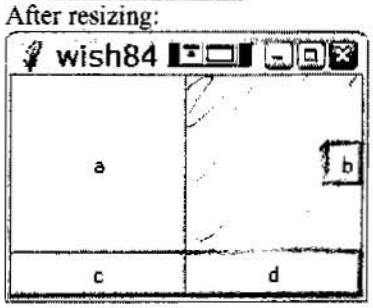
Question 8 (4 marks)

Give the values for the grid constraints that would lead to the following window-resize behaviour.

Before resizing:



After resizing:



grid -row 0 -column 0 -weightx 1 -weighty = 1 -sticky nw
grid -row 0 -column 1 -weightx = 0 -weighty = 0 -sticky e
grid -row 1 -column 0 -weightx = 1 -weighty = 0 -sticky we
grid -row 1 -column 1 -weightx = 1 -weighty = 0 -sticky we

Question 14 (8 marks)

In a structured drawing program, the user selects a square in the drawing and presses the 'Delete' key. From the time of the keypress until the time that the square disappears from the screen, state what happens in the different parts of the MVC architecture.

- User presses delete.
- Toolkit notices keypress and sends it to the Controller
- Controller gets the selected square from the view.
- Controller calls model.delete(Square)
- The square is removed from the model and the model calls the view(s) for repainting
- The views then call the toolkit for repainting
- The toolkit calls the view for the damage area
- the view calls the model to get the area
- model returns the area to the view which returns it to the toolkit
- The toolkit redraws the area.

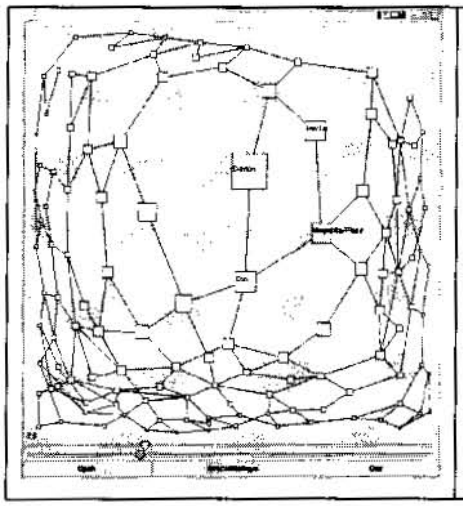
Question 15 (2 marks)

Describe how object positions should be stored in a model, in order that the objects can be drawn correctly to devices with different sizes and coordinate systems. State how the model coordinates can be converted to the display coordinates.

The object's position should be stored as relative coordinates and should be calculated for the current device. The model's coordinates can be converted to display coordinates simply by multiplying the x coordinate by the devices' width and by taking the height minus the y coordinate multiplied by the height.

Question 9 (10 marks)

For the given example application, complete the table to show which layer (from hardware to application) is the first to process the given event in a meaningful way, and which layer (if any) processes it next.



Event/Component	Handling layer	Forward to...
Drag title bar	Window Manager	OS
Click "Dayton" icon	UI Toolkit	Application
Drag slider thumb	UI Toolkit	Application
Click close box	Window Manager	UI Toolkit
Resize window	Window Manager	UI Toolkit

Question 16 (8 marks).

Write a program in either Java or Tcl/Tk that demonstrates grid snapping for graphical interaction. The system should show a dot at the closest grid location to the current position of the mouse.

```
pack [canvas .c  bg white]
bind .c <Button-1> { snapDot $x $y }

proc snapDot {x y}
{
   set gridX [.c find closest $x]
   set gridY [.c find closest $y]
   set newX [gridX cget -x]
   set newY [gridY cget -y]
  .c create oval newX newY [expr newX+1] [expr newY+1] -fill red
}
```

Note: This assumes that there are already grid lines drawn on the canvas as separate lines.

Bonus (1 mark)

Circle the values that would create brown in the RGB colour system.

R:	0	(64)	128	192	255
G:	0	64	128	(192)	255
B:	(0)	64	128	192	255